

**BOILER AND PRESSURE VESSEL
RULES AND REGULATIONS**

16 VAC 25-50-10 et seq.



**VIRGINIA SAFETY AND HEALTH CODES BOARD
AND
VIRGINIA DEPARTMENT OF LABOR AND INDUSTRY**

Effective Date: July 2, 2003

16 VAC 25-50-10 et seq. BOILER AND PRESSURE VESSEL RULES AND REGULATIONS**PART I
Definitions.****16 VAC 25-50-10 Definitions.**

The following words and terms, when used in this chapter, shall have the following meanings, unless the context clearly indicates otherwise:

“Act” means the Boiler and Pressure Vessel Safety Act, Chapter 3.1 (§ 40.1-51.5 et seq. of Title 40.1) of the Code of Virginia.

“Alteration” means any change in the item described on the original Manufacturers' Data Report which affects the pressure containing capability of the boiler or pressure vessel. Non-physical changes, such as an increase in the maximum allowable working pressure (internal or external) or design temperature of a boiler or pressure vessel, shall be considered an alteration. A reduction in minimum temperature such that additional mechanical tests are required shall also be considered an alteration.

“Approved” means acceptable to the board, commissioner or chief inspector as applicable.

“ASME Code” means the Boiler and Pressure Vessel Code of the American Society of Mechanical Engineers approved and adopted by the governing council of such society and approved and adopted by the board.

“Authorized Inspection Agency” means one of the following:

- a. A department or division established by a state, commonwealth or municipality of the United States, or a province of Canada which has adopted one or more sections of the Boiler and Pressure Vessel Code of the ASME and whose inspectors hold valid commissions with the National Board of Boiler and Pressure Vessel Inspectors; or equivalent qualifications as defined and set forth in 16 VAC 25-50-50 and 16 VAC 25-50-70;
- b. An inspection agency of an insurance company which is authorized (licensed) to write boiler and pressure vessel insurance in those jurisdictions which have examined the agency's inspectors to represent such jurisdictions as is evident by the issuance of a valid certificate of competency to the inspector;
- c. An owner-user inspection agency as defined in this section; or
- d. A contract fee inspector.

“Board” means the Virginia Safety and Health Codes Board.

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“Boiler” means a closed vessel in which water is heated, steam is generated, steam is superheated, or any combination of them, under pressure or vacuum for use externally to itself by the direct application of heat. The term "boiler" shall include fired units for heating or vaporizing liquids other than water where these units are separate from processing systems and are complete within themselves.

“Certificate of competency” means a certificate issued by the commissioner to a person who has passed the prescribed examination as provided in 16 VAC 25-50-50. See §§ 40.1-51.9 and 40.1-51.9:1 of the Act.

“Certificate inspection” means an inspection, the report of which is used by the chief inspector to decide whether or not a certificate, as provided for in § 40.1-51.10 of the Act, may be issued. This certificate inspection shall be an internal inspection when required; otherwise, it shall be as complete an inspection as possible.

“Chief inspector” means the chief boiler and pressure vessel inspector of the Commonwealth.

“Commission, National Board” means the commission issued by the National Board to a holder of a Certificate of Competency for the purpose of conducting inspections in accordance with the National Board Bylaws and this chapter. The employer must submit the inspector's application to the National Board for a commission.

“Commissioner” means the Commissioner of the Department of Labor and Industry.

“Commonwealth inspector” means any agent appointed by the commissioner under the provisions of § 40.1-51.9 of the Act.

“Condemned boiler or pressure vessel” means a boiler or pressure vessel that has been inspected and declared unsafe for use or disqualified by legal requirements and to which a stamping or marking designating its condemnation has been applied by the chief or commonwealth inspector.

“Department” means the Department of Labor and Industry.

“Division” means the Boiler Safety Enforcement Division of the Department of Labor and Industry.

“Electric boiler” means a boiler in which the source of heat is electricity.

“Examining Board” means persons appointed by the chief inspector to monitor examinations of inspectors.

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“Existing installation” means and includes any boiler or pressure vessel constructed, installed, placed in operation or contracted for before July 1, 1974.

“External inspection” means an inspection of the exterior of the boiler or pressure vessel and its appliances when the item is in operation.

“Heating boiler” means a steam or vapor boiler operating at pressures not exceeding 15 psig, or a hot-water boiler operating at pressures not exceeding 160 psig or temperature not exceeding 250° F at or near the boiler outlet.

“High-pressure, high-temperature water boiler” means a water boiler operating at pressures exceeding 160 psig or temperatures exceeding 250° F at or near the boiler outlet.

“Hobby boiler” means a steam boiler which serves no commercial purpose and is used solely for hobby or display and operated solely for the enjoyment of the owner.

“Hot-water supply boiler” means a boiler furnishing hot water to be used externally to itself at pressures not exceeding 160 psig or temperatures not exceeding 250° F at or near the boiler outlet, with the exception of boilers which are directly fired by oil, gas or electricity where none of the following limitations are exceeded:

- a. Heat input of 200,000 BTU per hour;
- b. Water temperature of 210° F; or
- c. Nominal water containing capacity of 120 gallons.

“Hot-water supply storage tanks” means those heated by steam or any other indirect means where any one of the following limitations are exceeded:

- a. Heat input of 200,000 BTU per hour;
- b. Water temperature of 210° F; or
- c. Nominal water containing capacity of 120 gallons.

“Inspection certificate” means a certificate issued by the chief inspector for the operation of a boiler or pressure vessel.

“Inspector” means the chief inspector, commonwealth inspector or special inspector.

“Internal inspection” means a complete examination of the internal and external surfaces of a boiler or pressure vessel and its appliances while it is shut down and manhole plates, handhole plates or other inspection openings removed.

“Lap seam crack” means a failure in a lap joint extending parallel to the longitudinal joint and located either between or adjacent to rivet holes.

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“Miniature boiler” means any boiler which does not exceed any one of the following limits:

- a. 16 inches inside diameter of shell;
- b. 20 square feet heating surface;
- c. 5 cubic feet gross volume, exclusive of casing and insulation; or
- d. 100 psig maximum allowable working pressure.

“National Board” means the National Board of Boiler and Pressure Vessel Inspectors, 1055 Crupper Avenue, Columbus, OH 43229, whose membership is composed of the chief inspectors of government jurisdictions who are charged with the enforcement of the provisions of the ASME Code.

“National Board Inspection Code” means the manual for boiler and pressure vessel inspectors published by the National Board. Copies of this Code may be obtained from the National Board.

“New boiler or pressure vessel installation” means all boilers or pressure vessels constructed, installed, placed in operation or contracted for after July 1, 1974.

“NFPA” means the National Fire Protection Association.

“Nonstandard boiler or pressure vessel” means a boiler or pressure vessel that does not bear the stamp of Commonwealth of Virginia, the ASME stamp or the National Board stamp when applicable.

“Owner or user” means any person, partnership, firm or corporation who is legally responsible for the safe operation of a boiler or pressure vessel within the Commonwealth.

“Owner-user inspection agency” means any person, partnership, firm or corporation registered with the chief inspector and approved by the Board as being legally responsible for inspecting pressure vessels which they operate in this Commonwealth.

“Portable boiler” means an internally fired boiler which is primarily intended for temporary location and whose construction and usage permit it to be readily moved from one location to another.

“Power boiler” means a boiler in which steam or other vapor is generated at a pressure of more than 15 psig.

“Pressure vessel” means a vessel in which the pressure is obtained from an external source, or by the application of heat from an indirect source, or from a direct source, other than

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those boilers defined in Part I (16 VAC 25-50-10 et seq.) of this chapter.

“PSIG” means pounds per square inch gauge.

“R Certificate of Authorization” means an authorization issued by the National Board for the repair and alteration of boilers and pressure vessels.

“Reinstalled boiler or pressure vessel” means a boiler or pressure vessel removed from its original setting and reinstalled at the same location or at a new location.

“Repair” means work necessary to return a boiler or pressure vessel to a safe and satisfactory operating condition, provided there is no deviation from the original design.

“Secondhand boiler or pressure vessel” means a boiler or pressure vessel which has changed both location and ownership since the last certificate inspection.

“Special inspector” means an inspector holding a Virginia Certificate of Competency, and who is regularly employed by an insurance company authorized (licensed) to write boiler and pressure vessel insurance in this Commonwealth, an inspector continuously employed by any company operating pressure vessels in this Commonwealth used or to be used by the company, or a contract fee inspector.

“Standard boiler or pressure vessel” means a boiler or pressure vessel which bears the stamp of the Commonwealth of Virginia, the ASME stamp and the National Board stamp when applicable.

“Underwriters' Laboratories” means Underwriters' Laboratories, Inc., 333 Pfingsten Road, Northbrook, Illinois 60062, which is a nonprofit, independent organization testing for public safety. It maintains and operates laboratories for the examination and testing of devices, systems, and materials to determine their relation to life, fire, casualty hazards and crime prevention.

“VR Certificate of Authorization” means an authorization issued by the National Board for the repair of pressure relief valves.

“Water heater” means a vessel used to supply: (i) potable hot water; or (ii) both space heat and potable water in combination which is directly heated by the combustion of fuels, electricity, or any other source and withdrawn for use external to the system at pressures not to exceed 160 psi or temperatures of 210° F. This term also includes fired storage water heaters defined by the Virginia Uniform Statewide Building Code as a “water heater”.

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Administration.****16 VAC 25-50-15 Effective Date of Certain Requirements of the Regulation.**

The applicable requirements of the sections and subsections listed below shall not be enforced until April 1, 1999. On or after April 1, 1999, all sections and subsections of the published regulation shall be enforceable:

1. Subsection C of 16 VAC 25-50-70 regarding endorsement requirements for inspecting repairs or alterations;
2. 16 VAC 25-50-250 regarding endorsement requirements for inspecting repairs or alterations;
3. Subdivision F 11 of 16 VAC 25-50-360 regarding repairs conducted by holders of a “VR” stamp;
4. Subsection G of 16 VAC 25-50-370 regarding repairs conducted by holders of a “VR” stamp;
5. Subdivision E 2 of 16 VAC 25-50-380 regarding repairs conducted by holders of a “VR” stamp; and
6. Subsections A, B, and C of 16 VAC 25-50-480 regarding endorsement requirements for conducting and inspecting repairs or alterations.

16 VAC 25-50-20 Minimum construction standards for boilers and pressure vessels.

A. Boilers and pressure vessels to be installed for operation in this Commonwealth shall be designed, constructed, inspected, stamped and installed in accordance with the applicable ASME Boiler and Pressure Vessel Code including all addenda and applicable code case(s), other international construction standards which are acceptable to the chief inspector, and this chapter.

B. Boilers and pressure vessels shall bear the National Board stamping, except cast iron boilers and UM vessels. A copy of the Manufacturers' Data Report, signed by the manufacturer's representative and the National Board commissioned inspector, shall be filed by the owner or user with the chief inspector prior to its operation in the Commonwealth.

C. Pressure piping - (including welded piping)- Piping external to power boilers extending

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from the boiler to the first stop valve of a single boiler, and to the second stop valve in a battery of two or more boilers is subject to the requirements of ASME Power Boiler Code, Section I, and the design, fabrication, installation and testing of the valves and piping shall be in conformity with the applicable paragraphs of ASME code. Applicable ASME data report forms for this piping shall be furnished by the owner to the chief inspector. Construction rules for materials, design, fabrication, installation and testing both for the boiler external piping and the power piping beyond the valve or valves required by ASME Power Boiler Code, Section I, are referenced in ANSI B31.1, Power piping, and the code.

D. Boilers and pressure vessels brought into the Commonwealth and not meeting code requirements shall not be operated unless the owner/user is granted a variance in accordance with § 40.1-51.19 of the Act.

The request for variance shall include all documentation related to the boiler or pressure vessel that will provide evidence of equivalent fabrication standards, i.e., design specification, calculations, material specifications, detailed construction drawings, fabrication and inspection procedures and qualification records, examination, inspection and test records, and any available manufacturers' data report.

In order to facilitate such a variance approval, the submission of documentation, in the English language and in current U.S. standard units of measure would be helpful. The following list of documents, while not all inclusive, would be useful in providing evidence of safety equivalent to ASME Code construction:

1. List of materials used for each pressure part;
2. The design calculations to determine the maximum allowable working pressure in accordance with the ASME Boiler and Pressure Vessel Code, applicable section, edition and addenda;
3. The design code used and the source of stress values for the materials used in the design calculations;
4. The welding procedures used and the qualification records for each procedure;
5. The material identification for each type of welding material used;
6. The performance qualification records for each welder or welding operator used in the construction of the boiler or pressure vessel;
7. The extent of any non-destructive examination (NDE) performed and the qualification records of NDE operators;

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8. Record of final pressure test signed by a third party inspector;
9. Name and organization of the third party inspection agency;
10. A certification from a licensed professional engineer stating that the boiler or pressure vessel has been constructed to a standard providing equivalent safety to that of the ASME Boiler and Pressure Vessel Code. A signature, date and seal of the certifying engineer is required;
11. Where applicable, a matrix of differences between the actual construction of the boiler or pressure vessel for which a variance is requested and a similar boiler or pressure vessel that is code stamped; and
12. Where applicable, a letter from an insurance company stating that it will insure the boiler or pressure vessel.

After notification of a violation of these rules and regulations an owner/user desiring a variance shall submit a request for variance within 30 days.

The chief inspector shall respond to any request for a variance within 30 days of receipt of all required documentation, and shall submit a recommendation to the commissioner, who will make the decision on the variance.

E. Before secondhand equipment is installed, application for permission to install shall be filed by the owner or user with the chief inspector and approval obtained.

F. Electric boilers, subject to the requirements of the Act and this chapter, shall bear the Underwriters' Laboratories label on the completed unit or assembly by the manufacturer. This label shall be in addition to the code symbol stamping requirements of the ASME and the National Board.

16 VAC 25-50-30 Frequency of inspections of boilers and pressure vessels.

A. Power boilers and high-pressure, high-temperature water boilers shall receive an annual internal inspection for certification. Such boilers shall also receive, where possible, an annual external inspection, given while under representative operating conditions.

B. Heating boilers shall receive a certificate inspection biennially.

1. Steam boilers shall receive an internal inspection where construction permits.

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2. Water boilers shall receive an external inspection with an internal inspection at the discretion of the inspector where construction permits.
- C. Except as provided for in subsection E of this section, pressure vessels subject to internal corrosion shall receive a certificate inspection biennially. This inspection shall be an internal inspection conducted at the discretion of the inspector where construction permits.
- D. Except as provided for in subsection E of this section, pressure vessels not subject to internal corrosion shall receive a certificate inspection biennially. This inspection shall be an external inspection, with an internal inspection conducted at the discretion of the inspector where construction permits.
- E. Pressure vessels that are under the supervision of an authorized owner-user inspection agency shall be inspected at intervals in a manner as agreed upon between the Commissioner and that agency.
- F. Boiler and pressure vessel components of nuclear power plants, that are included in the Act, shall be inspected as provided by Section XI of the ASME Boiler and Pressure Vessel Code.
- G. Based upon documentation of such actual service conditions by the owner or user of the operating equipment, the Commissioner may permit variations in the inspection requirements as provided in the Act.

16 VAC 25-50-40 Notification of inspection.

- A. Certificate inspections shall be scheduled in accordance with the frequency established in § 40.1-51.10 of the Act and at a time mutually agreeable to the inspector and owner or user.
- B. External inspections may be performed by the inspector during normal working hours and without prior notification.
- C. When, as a result of external inspection or determination by other objective means, it is the inspector's opinion that continued operation of the boiler or pressure vessel constitutes a menace to public safety, the inspector may require an internal inspection or an appropriate pressure test to evaluate conditions. In these instances the owner or user shall prepare the boiler or pressure vessel for an internal inspection or appropriate pressure test as the inspector designates.

16 VAC 25-50-50 Examination for an inspector's certificate of competency.

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A. Examination for an inspector's certificate of competency in accordance with the requirements of § 40.1-51.9 of the Code of Virginia shall be held at the office of the commissioner or at any other location selected by the commissioner, four times each year, on the first Wednesday and Thursday of March, June, September and December.

B. An applicant for an examination shall have a minimum of 5 credit points accumulated under the following subdivisions:

1. Education (1 credit minimum, 4 credits maximum)

Category	Credit Points
a. Technical Training in Boiler and Pressure Vessel Inspection (1 pt. maximum)	1
Includes any of the following:	
Continuing Education: Having completed and received a passing grade in a training course in at least one of the following (or related) subjects: quality assurance, engineering, fabrication methods, nondestructive examination or inspection. The training course(s) may be a correspondence course or conducted in a classroom.	
Coded Courses: Completion of a course on knowledge, understanding and general structure of the National Board Inspection Code or other codes or related standards, as applicable.	
Other Courses: Completion of a course on procedures and techniques of auditing, and/or basic inspection methods.	
b. Technical Curriculum:	2
Includes any of the following:	
A diploma from an accredited technical school,	
Power Engineering Certificate,	
Accredited Trade Certificate in such skills as a welder, boilermaker, mechanic, steam fitter, machinist, or millwright,	
Evidence of completion of a military or merchant marine training course in the area of marine or stationary boilers or pressure vessels.	
c. College/University	3
Includes any of the following:	
Associate's Degree in science, mathematics or engineering	

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Bachelor's Degree in Science or Mathematics

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| d. | College/University
Bachelor's Degree in engineering | 4 |
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2. Experience (1 credit minimum, 4 credits maximum)

Credit as shown for each full year's technical experience associated with boilers and pressure vessels in the categories listed below.

Category	Credit Points/Each full year of experience
a. Engineering, design	1
b. Manufacturing, including fabrication methods or processes in either shop or field.	1
c. Responsible charge in the operation of boilers exceeding 50,000 pounds of steam per hour total capacity.	1
d. Perform repair, alteration or maintenance of boilers or pressure vessels.	1
e. Quality control system related to boiler or pressure vessel manufacturing, repair or alteration in either shop or field.	1
f. Inspection of boilers and pressure vessels either in service or during construction including either shop or field.	1
g. An Nondestructive Examination Level II examiner of boilers and pressure vessels.	1

C. Applications for examination shall be in writing on a form furnished by the commissioner stating the education of the applicant, a list of his employers, his period of employment and position held with each employer.

D. Applications containing willful falsifications or untruthful statements shall be rejected.

E. If the applicant's education and experience are acceptable to the examining board, he shall be given a written examination dealing with the construction, installation, operation, maintenance and repair of boilers and pressure vessels and their appurtenances, and the applicant shall be accepted or rejected on the merits of this examination.

F. If the applicant passes the written examination, a certificate of competency may be issued by the commissioner, when the inspector is employed by an authorized inspection agency as defined in 16 VAC 25-50-10.

G. After 90 days, an applicant who fails to pass the examination will be permitted to take another written examination and his acceptance or rejection will be determined on the basis of his

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examination. Applicants who fails to obtain a passing grade on the examination after three attempts shall not be permitted to take the examination for at least one year following the last attempt.

16 VAC 25-50-60 Examination fees.

A fee of \$50 will be charged for each applicant taking the examination for a certificate of competency. In the event an applicant fails the examination, the applicant may be re-examined within one year of the initial test date without additional charge. Checks or money orders for examination fees shall be made payable to the Treasurer of Virginia and sent to the chief inspector.

16 VAC 25-50-70 Certificate of competency and identification card.

A. Upon request and subject to subsection B of this section, a certificate of competency and an identification card shall be issued by the commissioner to:

1. An inspector who is employed full time by a governmental authority having an authorized inspection agency as defined in 16 VAC 25-50-10.
2. An inspector who is employed by an insurance company which is authorized (licensed) to write boiler and pressure vessel insurance in this Commonwealth.
3. An inspector who is employed by a company which operates unfired pressure vessels in Virginia and has a valid owner-user inspection agency agreement as provided in 16 VAC 25-50-120.
4. A contract fee inspector.

B. The applicant must pass the examination as set forth in 16 VAC 25-50-50 and pay the application fee of \$50.00; or hold a valid commission or certificate of competency from a state that has a standard of examination substantially equal to that of Virginia, and a valid commission and identification card issued by the National Board.

C. Requests for a certificate of competency, identification card and endorsements shall be completed on forms provided by the chief inspector and shall be accompanied by, when applicable, a facsimile of the applicant's commission, certificate of competency and identification cards, named above, and a processing fee of \$20 payable to the Treasurer of Virginia. An endorsement of the Virginia identification card is required for inspecting repairs or alterations. Inspectors holding a valid "A" or "B" national qualification or passing a written examination given

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by the department shall apply on forms provided by the chief inspector.

D. The Virginia valid identification card shall be returned to the chief inspector when the certificate holder is no longer employed by the organization employing him at the time that the certificate was issued or, in the case of a self-employed contract fee inspector, has ceased inspection activities.

E. Each person holding a valid Virginia certificate of competency and who conducts inspections as provided by the Act shall apply to the chief inspector on forms provided by the chief inspector and obtain an identification card biennially, not later than June 30 of the year in which the card is due for renewal. A processing fee of \$20 for each card, payable to the Treasurer of Virginia, shall accompany the application.

F. An inspector's certificate of competency may be suspended by the chief inspector after due investigation and recommendation by the commissioner, for incompetence or untrustworthiness of the holder of the certificate, or for willful falsification of any matter or statement contained in his application, or in a report of any inspection made by him. Written notice of any suspension shall be given by the chief inspector to the inspector and his employer. Persons whose certificate of competency has been suspended shall be entitled to an appeal to the board as provided for in the act and to be present in person or to be represented by counsel at the hearing of the appeal.

16 VAC 25-50-80 Inspectors to have no other interests.

Inspectors shall not engage in the sale of any article or device relating to boilers, pressure vessels or their appurtenances. Contract fee inspectors shall not have a direct financial interest in any repairs conducted on boilers, pressure vessels, or their appurtenances which they inspect.

16 VAC 25-50-90 Inspection reports to be submitted by special inspectors.

A. Special inspectors shall submit first inspection reports to the chief inspector on Form BPV-5 for each boiler and pressure vessel subject to registration and inspection in this Commonwealth.

B. Except as provided in subsection E of this section, subsequent inspections of both standard and nonstandard boilers and pressure vessels shall be reported on Forms NB-6 and NB-7 of the National Board Inspection Code or Commonwealth Form BPV 6-7.

C. Inspection reports, as required in subsections A and B of this section, shall be submitted within 30 days from date of inspection.

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D. When hazardous conditions are found in a boiler or pressure vessel which would present an immediate threat to life or property, the owner or user shall immediately take action to correct the hazardous conditions or remove the object from service. The inspector shall notify the office of the chief inspector immediately by telephone followed by a written report. A complete and thorough inspection shall be conducted to evaluate the hazardous conditions and to make recommendations for necessary corrective measures. The boiler or pressure vessel shall not be returned to service until it has been restored to a safe operating condition under the requirements of this chapter.

E. Owner-user inspection agencies may report subsequent inspections of both standard and nonstandard pressure vessels on Form NB-7 or at their option, upon forms approved by the board. The report shall be filed as provided in 16 VAC 25-50-120.

16 VAC 25-50-100 Insurance companies and contract fee inspectors to notify Chief Inspector of contractual changes.

All insurance companies shall notify the Chief Inspector, within 30 days, of all boilers or pressure vessels on which insurance is written, canceled, not renewed, or suspended because of unsafe conditions.

All contract fee inspectors shall notify the Chief Inspector, within 30 days, of all boilers or pressure vessels on which they contract to provide inspection services.

16 VAC 25-50-110 Special inspectors to notify Chief Inspector of unsafe boilers and pressure vessels.

If, upon inspection, a special inspector finds a boiler or pressure vessel to be unsafe for initial or further operation, he shall promptly notify the owner or user, stating what repairs or other corrective measures are required to bring the object into compliance with this chapter. Unless the owner or user agrees to make the repairs or adopt such other corrective measures promptly, the special inspector shall immediately notify the chief inspector. Until corrections have been made no further operation of the boiler or pressure vessel involved shall be permitted. If an inspection certificate for the object is required and is in force, it shall be suspended by the chief inspector. When necessary repairs have been made or corrective actions have been taken and the boiler or pressure vessel is determined to be safe to operate by the inspector, the chief inspector shall be notified. At that time a certificate of inspection, where applicable, may be issued.

16 VAC 25-50-120 Owner-user inspection agency.

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A. Any person, firm, partnership or corporation operating pressure vessels in this Commonwealth may seek approval and registration as an owner-user inspection agency by filing an application with the chief inspector on forms prescribed and available from the department, and request approval by the board. Each application shall be accompanied by a bond in the penal sum of \$5,000 which shall continue to be valid during the time the approval and registration of the company as an owner-user inspection agency is in effect.

B. The application and registration shall show the name of the agency and its principal address in this Commonwealth, and the name and address of the person or persons having supervision over inspections made by the agency. Changes in supervisory personnel shall be reported to the chief inspector within 30 days after any change.

C. Each owner-user inspection agency as required by the provisions of the Act and this chapter shall:

1. Maintain its own inspection group under the supervision of one or more individuals who have independent authority to effect resolution of technical problems or procedures;
2. Conduct inspections of boilers or unfired pressure vessels, not exempt by the Act, utilizing only qualified inspection personnel, certified pursuant to 16 VAC 25-50-50, 16 VAC 25-50-60 and 16 VAC 25-50-70; in the case of unfired pressure vessels which are covered by the American Petroleum Institute code API-510, and are in use in the petroleum or chemical process industries, the owner-user inspection agency may, at its option, inspect and maintain such vessels by the API-510 Code;
3. Retain on file at the location where the equipment is inspected a true record or copy of the report of the latest of each inspection signed by the inspector who made the inspection;
4. Execute and deliver to the owner or user (management) a true report of each inspection together with appropriate requirements or recommendations that result from the inspections;
5. Promptly notify the chief inspector of any boiler or unfired pressure vessel which does not meet the requirements of safe operating conditions;
6. Maintain inspection records which will include a list of each boiler or unfired pressure vessel covered by the Act, showing a serial number and an abbreviated description as may be necessary for identification; the date of last inspection of each unit and approximate date for the next inspection, arrived at by applying the

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appropriate rules to all data available at the time the inspection record is compiled (re: frequency and type of inspection, see 16 VAC 25-50-30). This inspection record shall be readily available for examination by the chief inspector or his authorized representative during normal business hours; and

7. File a statement annually, on a date mutually agreed upon, with the chief inspector. This statement shall be signed by the individual having supervision over the inspections made during the period covered. The statement shall include the number of vessels, covered by the Act, inspected during the year and certifying that each inspection was conducted pursuant to the inspection requirements provided for by the Act and in a format acceptable to the chief inspector. The annual statement shall be accompanied by a filing fee in accordance with the schedule in § 40.1-51.11:1 of the Act as follows:
 - a. For statements covering not more than 25 vessels - \$7 per vessel;
 - b. For statements covering more than 25 vessels but less than 101 vessels - \$200;
 - c. For statements covering more than 100 but less than 501 vessels - \$400; and
 - d. For statements covering more than 500 vessels - \$800.

16 VAC 25-50-130 Defective conditions disclosed at time of external inspection.

If, upon an external inspection, there is evidence of a leak or crack, sufficient covering of the boiler or pressure vessel shall be removed to permit the inspector to satisfactorily determine the safety of the boiler or pressure vessel. If the covering cannot be removed at that time, the inspector may order the operation of the boiler or pressure vessel stopped until the covering can be removed and proper examination made.

16 VAC 25-50-140 Owner or user to notify chief inspector of accident.

When an accident occurs which renders a boiler or pressure vessel inoperative, the owner or user shall immediately notify the chief inspector, and the authorized inspector shall submit a detailed report of the accident. In case of a serious accident, as in a personal injury or an explosion, notice shall be given immediately by telephone, telegraph, facsimile or messenger, and neither the boiler or pressure vessel, nor any parts of it, shall be removed or disturbed before an inspection has been made by the inspector, except for the purpose of conserving human life and

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limiting consequential damage.

16 VAC 25-50-150 Inspection certificate and inspection fees.

A. Upon the inspection and determination that a boiler or pressure vessel is suitable and conforms to this chapter, the owner or user shall remit the payment for an inspection certificate in one of the following forms and amounts for each item required to be inspected under the Act.

1. Payment of \$20 may be sent from the owner or user to the chief inspector by check, credit card or money order. Payment of inspection certificate fees should be made payable to the Treasurer of Virginia, or,
2. Payment may be presented to a special inspector, where the inspector is authorized to collect and forward such fees on the department's behalf. The commissioner may authorize special inspectors to collect and forward to the chief inspector \$ 16 for each inspection certificate. Pursuant to § 40.1-51.10:1 of the Code of Virginia, special inspectors may charge owners or users a fee not exceeding \$ 4.00 for collecting and forwarding inspection certificate fees.
An inspection certificate will not be issued to the owner or user until payment is received by either the department, or if previously authorized, by a special inspector.

B. The chief inspector may extend an inspection certificate for up to three additional months beyond a two month grace period following the expiration of a certificate. Such extension is subject to a satisfactory external inspection of the boiler or pressure vessel and receipt of a fee of \$20 for each month of extension.

C. When the chief inspector determines that no contract fee inspectors are available to inspect a regulated uninsured boiler or pressure vessel in a timely manner, a commonwealth inspector may be directed to conduct a certification inspection. Contract fee inspection service shall be determined unavailable where (i) at least two contract fee inspectors contacted will not agree to provide inspection services to the owner or user within at least 21 days from the request, and (ii) the owner's or user's inspection certificate will expire within that same period.

The following rates per inspected object, in addition to inspection certificate fees, shall apply for certification inspections conducted by a commonwealth inspector:

1. Power boilers and high pressure, high temperature water
boilers.....\$135
2. Heating boilers.....\$70

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3. Pressure vessels.....\$50

D. The review of a manufacturer's or repair organization's facility for the purpose of national accreditation will be performed by the chief inspector or his qualified designee for an additional fee of \$800 per review or survey.

E. The owner or user who causes a boiler or pressure vessel to be operated without a valid certificate shall be subject to the penalty as provided for in § 40.1-51.12 of the Act.

F. Inspection certificates are not required for unfired pressure vessels inspected by an authorized owner-user inspection agency. However, the agency shall keep on file in its office in the establishment where the equipment is located a true record or copy of the report of the latest of each inspection signed by the inspector who made the inspection.

16 VAC 25-50-160 Validity of inspection certificate.

An inspection certificate, issued in accordance with Part II, 16 VAC 25-50-150, shall be valid until expiration unless some defect or condition affecting the safety of the boiler or pressure vessel is disclosed. The certificate issued for a boiler or pressure vessel inspected by an inspection agency of an insurance company shall be valid only if the boiler or pressure vessel for which it was issued continues to be insured by an insurance company authorized (licensed) to write boiler and pressure vessel insurance in this Commonwealth.

16 VAC 25-50-170 Restamping boilers and pressure vessels.

When the stamping on a boiler or pressure vessel becomes indistinct, the inspector shall instruct the owner or user to have it restamped. Request for permission to restamp the boiler or pressure vessel shall be made to the chief inspector and proof of the original stamping shall accompany the request. The chief inspector may grant the authorization. Restamping authorized by the chief inspector shall be done only in the presence of an inspector, and shall be identical with the original stamping, except that it will not be required to restamp the ASME Code Symbol. Notice of completion of restamping shall be filed with the chief inspector by the inspector who witnessed the stamping on the boiler or pressure vessel, together with facsimile of the stamping applied.

16 VAC 25-50-180 Penalty for operation of unsafe boilers and pressure vessels.

If, upon inspection, a boiler or pressure vessel is found to be unsafe to operate, the inspector shall notify the chief inspector as required in Part II, 16 VAC 25-50-110, and the

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inspection certificate shall be suspended by the chief inspector. Any person, firm, partnership or corporation causing a boiler or pressure vessel to continue to be operated shall be subject to the penalty provided in the Act.

16 VAC 25-50-190 Condemned boilers and pressure vessels.

A. Any boiler or pressure vessel having been inspected and declared unsafe by the chief inspector or commonwealth inspector shall be stamped by the inspector with the letters "XXX" on both sides of the postal abbreviation of this Commonwealth, as shown by the following facsimile, which will designate a condemned boiler or pressure vessel:

XXX VA XXX

B. Any person, firm, partnership, or corporation using or offering for sale a condemned boiler or pressure vessel for operation within this Commonwealth shall be subject to the penalties provided by the Act.

16 VAC 25-50-200 Reinstallation of standard boilers or pressure vessels.

If a standard boiler or pressure vessel located in this Commonwealth is to be moved to another location for temporary use or repair, application shall be made by the owner or user to the chief inspector for permission to reinstall the boiler or pressure vessel.

16 VAC 25-50-210 Installation or reinstallation of nonstandard boilers or pressure vessels.

A. Installation and operation of nonstandard boilers and pressure vessels in the Commonwealth is prohibited without permission from the commissioner.

B. A nonstandard boiler or pressure vessel which is moved outside the boundaries of the Commonwealth cannot be reinstalled in the Commonwealth without the owner or user securing permission from the commissioner.

16 VAC 25-50-220 Installation of used or secondhand boilers or pressure vessels.

Before a used or secondhand boiler or pressure vessel can be shipped for the purpose of installation in this Commonwealth, an inspection must be made by an inspector qualified by an examination equal to that required by this Commonwealth or by an inspector holding a valid National Board commission. Data submitted by the inspector shall be filed by the owner or user of

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the boiler or pressure vessel with the chief inspector for his approval. Boilers and pressure vessels when installed in this Commonwealth shall be equipped with fittings and appliances that comply with this chapter for new installations.

16 VAC 25-50-230 Reinstalled boiler or pressure vessel.

When a boiler or pressure vessel is moved and reinstalled, the attached fittings and appliances shall comply with this chapter for new installations.

16 VAC 25-50-240 Factor of safety for existing installations.

Any inspector may increase the factor of safety on any existing installation if the condition of the boiler or pressure vessel warrants it. If the owner or user does not concur with the inspector's decision, the owner or user may appeal to the commissioner who may request a joint inspection by the chief inspector or the commonwealth inspector and the special inspector. The chief inspector shall make a report to the commissioner and the commissioner shall make the final decision, based upon the data contained in the inspector's reports. The decision of the commissioner may be appealed to the board pursuant to § 40.1-51.16 of the Code of Virginia.

16 VAC 25-50-250 Repairs or alterations.

When repairs or alterations are to be made, permission shall be obtained from an inspector with an appropriate endorsement and the repairs shall be done in accordance with the National Board Inspection Code and this chapter.

16 VAC 25-50-260 Removal of safety appliances.

A. No person shall attempt to remove or do any work on any safety appliance prescribed by this chapter while a boiler or pressure vessel is in operation, except as provided in applicable sections of the ASME Code. Should any of these appliances be removed for repair during an outage of a boiler or pressure vessel, they must be reinstalled and in proper working order before the object is again placed in service.

B. No person shall load the safety valve or valves in any manner to maintain a working pressure in excess of that stated on the inspection certificate.

16 VAC 25-50-270 Review fees.

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Reviews and emergency inspections other than certificate inspections, conducted by the chief inspector or commonwealth inspectors, including but not limited to consultations, data reviews, engineering evaluations, or quality control reviews shall be billed at the following rates:

1. For one-half day of four hours.....\$100 plus expenses, including travel and lodging
2. For one full day of eight hours.....\$200 plus expenses, including travel and lodging

16 VAC 25-50-280 Requirements for new installations.

A. No boiler or pressure vessel shall be installed in this Commonwealth unless it has been constructed, inspected and stamped as provided in Part II, 16 VAC 25-50-20 except:

1. Those exempt by the Act;
2. Those outlined in Part II, 16 VAC 25-50-20 D; and
3. Those existing boilers and pressure vessels which are to be reinstalled.

B. All new boiler and pressure vessel installations, including reinstalled and secondhand boilers and pressure vessels, shall be installed in accordance with the requirements of the ASME Code and this chapter.

C. A boiler or pressure vessel constructed equivalent to ASME standards, or having the standard stamping of another state that has adopted a standard of construction equivalent to the standard of this Commonwealth, may be accepted by the chief inspector. The person desiring to install the boiler or pressure vessel shall make application for the installation prior to construction and shall file the Manufacturers' Data Report for the boiler or pressure vessel with the chief inspector following construction and prior to installation.

D. The stamping shall not be concealed by insulation or paint and shall be exposed at all times unless a suitable record is kept of the location of the stamping so that it may be readily uncovered at any time this may be desired.

16 VAC 25-50-290 Application of Commonwealth serial numbers.

A. Upon completion of the installation of a new boiler or pressure vessel or at the time of the initial certificate inspection of an existing installation each boiler or pressure vessel shall be

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stamped with a serial number of the Commonwealth, consisting of the postal abbreviation for the Commonwealth and a unique series of numbers not less than 3/16- inch in height and arranged as follows:

VA 0000

B. All cast iron, low-pressure heating boilers shall have securely attached to the front of the boiler a metallic tag of not less than one inch in height, which shall have the serial number of the Commonwealth stamped on it.

C. All pressure vessels constructed of cast iron, or of a material of such thickness or type that it should not be stamped, shall have securely attached a metallic tag not less than one inch in height, which shall have the serial number of the Commonwealth stamped on it.

16 VAC 25-50-300 Return loop connection.

The return water connections to all low-pressure, steam heating boilers supplying a gravity return heating system shall be arranged to form a loop so that the water cannot be forced out of the boiler below the safe water level. This connection, known as a "return pipe loop connection," is shown in Section IV, ASME Heating Boiler Code.

16 VAC 25-50-310 Ladders, platforms, and runways.

Where valves and other appurtenances require frequent manipulation and are located so that they cannot be reached or operated from the floor, a platform or other safe means of operation shall be provided. If a platform or runway is used it shall be at least 24 inches wide and be provided with standard handrails and toeboards and have at least seven feet six inches head room. All runways shall have at least two means of exit, each exit to be remotely located from the other and connected to a permanent stairway or inclined ladder leading to the floor level, or an alternate means of escape or exit as may be practical for the specific installation.

16 VAC 25-50-320 Exit from boiler room.

All boiler rooms exceeding 500 square feet floor area and containing one or more boilers having a fuel burning capacity of 1,000,000 BTU per hour, or equivalent electrical heat input, shall have at least two means of exit. Each exit shall be remotely located from the other. Each elevation in a boiler room shall have two means of exit, each remotely located from the other.

16 VAC 25-50-10 et seq. BOILER AND PRESSURE VESSEL RULES AND REGULATIONS**16 VAC 25-50-330 Operation.**

The Recommended Rules for Care of Power Boilers, Section VII, and the Recommended Rules for Care of Heating Boilers, Section VI, of the ASME Code, shall be used as a guide for proper and safe operating practices.

16 VAC 25-50-340 Burner controls and safety devices.

Fired burner installations shall conform to the requirements of the following nationally recognized standards: the American Gas Association, Underwriters Laboratories, Part CG (General), Part CW (Steam and Waterside Control) of ANSI/ASME-CSD-1 or National Fire Protection Association (NFPA) No. 85 series as applicable.

16 VAC 25-50-350 Repairs and renewals of boiler fittings and appliances.

Whenever repairs are made to fittings or appliances or it becomes necessary to replace them, the repairs or replacements shall comply with the requirements of the ASME Code or the National Board Inspection Code.

**PART III
EXISTING INSTALLATIONS**

16 VAC 25-50-360 Power and high-pressure, high-temperature water boilers.

A. Age limit of existing boilers.

1. The age limit of any boiler of nonstandard construction, installed before July 1, 1974, other than one having a riveted, longitudinal lap joint, shall be 30 years, however; any boiler passing a thorough internal and external inspection, and not displaying any leakage or distress under a hydrostatic pressure test of 1-1/2 times the allowable working pressure held for at least 30 minutes, may be continued in operation without reduction in working pressure. The age limit of any boiler having riveted, longitudinal, lap joints and operating at a pressure in excess of 50 psig shall be 20 years. This type of boiler, when removed from an existing setting, shall not be reinstalled for a pressure in excess of 15 psig. A reasonable time for replacement, not to exceed one year, may be given at the discretion of the chief inspector.

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2. The shell or drum of a boiler in which a typical lap seam crack is discovered along a longitudinal riveted joint for either butt or lap joints shall be permanently removed from service.
 3. The age limit of boilers of standard construction, installed before July 1, 1974, shall be determined from the results of a thorough internal and external inspection by an authorized inspector and the application of an appropriate pressure test. Hydrostatic test pressure shall be 1-1/2 times the allowable working pressure and maintained for 30 minutes. The boiler may be continued in service at the same working pressure provided there is no evidence of leakage or distress under these test conditions.
 4. The minimum temperature of the water used for the hydrostatic test of low-pressure boilers and pressure vessels shall be 60°F. The minimum temperature of the water used for the hydrostatic test of power boilers shall be 70° F or ambient whichever is greater.
- B. The maximum allowable working pressure for standard boilers shall be determined in accordance with the applicable provisions of the edition of the ASME Code under which they were constructed and stamped.
- C. 1. The maximum allowable working pressure on the shell of a nonstandard boiler shall be determined by the strength of the weakest section of the structure, computed from the thickness of the plate, the tensile strength of the plate, the efficiency of the longitudinal joint or tube ligaments, the inside diameter of the weakest course and the factor of safety allowed by this chapter.

$\frac{TS \cdot t \cdot E}{R \cdot FS}$ = maximum allowable working pressure, psi

where:

TS = ultimate tensile strength of shell plates, psi,

t = minimum thickness of shell plate, in weakest course, inches

E = efficiency of longitudinal joint:

For tube ligaments, E shall be determined by the rules in Section I of the ASME Code for Power Boilers. For riveted joints, E shall be determined by the rules in the applicable edition of the ASME Code. For seamless construction, E shall be considered 100%.

R = inside radius of the weakest course of the shell, in inches,

FS = factor of safety permitted.

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2. Tensile strength. When the tensile strength of steel or wrought iron shell plates is not known, it shall be taken as 55,000 psi.
3. Crushing strength of mild steel. The resistance to crushing of mild steel shall be taken at 95,000 psi of cross-sectional area.
4. Strength of rivets in shear. When computing the ultimate strength of rivets in shear, the following values, in pounds per square inch, of the cross-sectional area of the rivet shank shall be used.

	PSI
Iron rivets in single shear.....	38,000
Iron rivets in double shear.....	76,000
Steel rivets in single shear.....	44,000
Steel rivets in double shear.....	88,000

When the diameter of the rivet holes in the longitudinal joints of a boiler is not known, the diameter and cross-sectional area of rivets, after driving, may be selected from Table 1, or as ascertained by cutting out one rivet in the body of the joint.

TABLE 1
SIZES OF RIVETS BASED ON PLATE THICKNESS
(in inches)

<u>Plate of Thickness</u>	<u>Rivet Diameter after Driving</u>
1/4	11/16
9/32	11/16
5/16	3/4
11/32	3/4
3/8	13/16
13/32	13/16
7/16	15/16
15/32	15/16
1/2	15/16
9/16	1-1/16

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5/8

1-1/16

5. Factors of safety. The following factors of safety shall be increased by the inspector if the condition and safety of the boiler demand it:
 - a. The lowest factor of safety permissible on existing installations shall be 4.5. Horizontal-return-tubular boilers having continuous longitudinal lap seams more than 12 feet in length, shall have a factor of safety of eight. When this type of boiler is removed from its existing setting, it shall not be reinstalled for pressures in excess of 15 psig.
 - b. Reinstalled or secondhand boilers shall have a minimum factor of safety of six when the longitudinal seams are of lap-riveted construction, and a minimum factor of safety of five when the longitudinal seams are of butt-strap and double-strap construction.

D. Cast-iron headers and mud drums. The maximum allowable working pressure on a water tube boiler, the tubes of which are secured to cast iron or malleable-iron headers, or which have cast iron mud drums, shall not exceed 160 psig.

E. Pressure on cast iron boilers. The maximum allowable working pressure for any cast iron boiler, except hot water boilers, shall be 15 psig.

F. Safety valves.

1. The use of weighted-lever safety valves, or safety valves having either the seat or disk of cast iron, shall be prohibited. Valves of this type shall be replaced by direct, spring-loaded, pop-type valves that conform to the requirements of the ASME Code, Section I.
2. Each boiler shall have at least one safety valve, and if it has more than 500 square feet of water-heating surface, or an electric power input of more than 500 kilowatts, it shall have two or more safety valves.
3. The valve or valves shall be connected to the boiler, independent of any other steam connection, and attached as close as possible to the boiler, without unnecessary intervening pipe or fittings. Where alteration is required to conform to this requirement, the chief inspector shall allow the owner or user reasonable time in which to complete the work.
4. No valves of any description shall be placed between the safety valve and the boiler nor on the escape pipe, if used, between the safety valve and the atmosphere, except as provided by applicable sections of the ASME code. When an escape pipe

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is used, it shall be at least full size of the safety-valve discharge and fitted with an open drain to prevent water lodging in the upper part of the safety valve or escape pipe. When an elbow is placed on a safety valve escape pipe, it shall be located close to the safety-valve outlet or the escape pipe shall be anchored and supported securely. All safety valve discharges shall be located or piped as not to endanger persons working in the area.

5. The safety-valve capacity of each boiler shall be so that the safety valve or valves will discharge all the steam that can be generated by the boiler without allowing the pressure to rise more than 6.0% above the highest pressure to which any valve is set, and in no case to more than 6.0% above the maximum allowable working pressure.
6. One or more safety valves on every boiler shall be set at or below the maximum allowable working pressure. The remaining valves may be set within a range of 3.0% above the maximum allowable working pressure, but the range of setting of all the safety valves on a boiler shall not exceed 10% of the highest pressure to which any valve is set.
7. When two or more boilers, operating at different pressures and safety valve settings, are interconnected, the lower pressure boilers or interconnected piping shall be equipped with safety valves of sufficient capacity to prevent overpressure, considering the maximum generating capacity of all boilers.
8. In those cases where the boiler is supplied with feedwater directly from water mains without the use of feeding apparatus (not to include return traps), no safety valve shall be set at a pressure higher than 94% of the lowest pressure obtained in the supply main feeding the boiler.
9. The relieving capacity of the safety valves on any boiler shall be checked by one of the three following methods and, if found to be insufficient, additional valves shall be provided:
 - a. By making an accumulation test, which consists of shutting off all other steam-discharge outlets from the boiler and forcing the fires to the maximum. The safety-valve capacity shall be sufficient to prevent a rise of pressure in excess of 6.0% of the maximum allowable working pressure. This method shall not be used on a boiler with a superheater or reheater.
 - b. By measuring the maximum amount of fuel that can be burned and computing the corresponding evaporative capacity (steam-generating capacity) upon the basis of the heating value of this fuel. These

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computations shall be made as outlined in the appendix of the ASME code, Section I;

- c. By measuring the maximum amount of feedwater that can be evaporated.

When either of the methods (b or c) outlined in this section is employed, the sum of the safety-valve capacities shall be equal to or greater than the maximum evaporative capacity (maximum steam-generating capacity) of the boiler.

10. The relieving capacity of safety valves for forced-flow steam generators shall be in accordance with the requirements of Section I of the ASME Boiler Code.
11. Safety valves and safety relief valves requiring repair shall be replaced with a new valve or repaired by the original manufacturer, its authorized representative or the holder of a "VR" Stamp.

G. Boiler feeding.

1. Each boiler shall have a feed supply which will permit it to be fed at any time while under pressure.
2. A boiler having more than 500 square feet of water-heating surface shall have at least two means of feeding, one of which shall be an approved feed pump, or injector. A source of feed directly from water mains at a pressure 6.0% greater than the set pressure of the safety valve with the highest setting may be considered one of the means. As provided in the ASME Power Boiler Code, Section I, boilers fired by gaseous, liquid or solid fuel in suspension may be equipped with a single means of feeding water provided means are furnished for the immediate shutoff of heat input if the water feed is interrupted.
3. The feedwater shall be introduced into the boiler in a manner so that it will not be discharged close to riveted joints of shell or furnace sheets, or directly against surfaces exposed to products of combustion, or to direct radiation from the fire.
4. The feed piping to the boiler shall be provided with a check valve near the boiler and a valve or cock between the check valve and the boiler. When two or more boilers are fed from a common source, there shall also be a valve on the branch to each boiler between the check valve and source of supply. Whenever a globe valve is used on feed piping, the inlet shall be under the disk of the valve.
5. In all cases where returns are fed back to the boiler by gravity, there shall be a check valve and stop valve in each return line, the stop valve to be placed between

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the boiler and the check valve, and both shall be located as close to the boiler as is practicable. No stop valves shall be placed in the supply and return pipe connections of a single boiler installation.

6. Where deaerating heaters are not employed, the temperature of the feedwater shall not be less than 120° F to avoid the possibility of setting up localized stress. Where deaerating heaters are employed, the minimum feedwater temperature shall not be less than 215° F so that dissolved gases may be thoroughly released.

H. Water level indicators.

1. Each boiler shall have at least one water gauge glass installed and located so that the lowest visible part of the water glass shall be at least two inches above the lowest permissible water level, at which level there will be no danger of overheating any part of the boiler when in operation at that level; except as provided by the ASME code.
2. No outlet connections (except for damper regulator, feedwater regulator, low-water fuel cutout, drain, steam gauges, or such apparatus that does not permit the escape of an appreciable amount of steam or water from it) shall be placed on the piping that connects the water column to the boiler. The water column shall be provided with a valved drain of at least 3/4 inch pipe size; the drain is to be piped to a safe location.
3. When the direct reading of gauge glass water level is not readily visible to the operator in his working area, dependable indirect indications shall be provided utilizing remote level indicators or equipment to transmit the gauge glass image. When remote level indication is provided for the operator instead of the gauge glass, the minimum level reference shall be clearly marked.

I. Steam gauges.

1. Each steam boiler shall have a steam gauge, with dial range not less than 1-1/2 times the maximum allowable working pressure, connected to the steam space or to the steam connection to the water column. The steam gauge shall be connected to a siphon or equivalent device of sufficient capacity to keep the gauge tube filled with water and arranged so that the gauge cannot be shut off from the boiler except by a cock with a tee or lever handle placed in the pipe near the gauge. The handle of the cock shall be parallel to the pipe in which it is located when the cock is open.
2. When a steam gauge connection longer than eight feet becomes necessary, a

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shutoff valve may be used near the boiler provided the valve is of the outside-screw-and-yoke type and is locked open. The line shall be of ample size with provision for free blowing.

3. Each boiler shall be provided with a test gauge connection and suitable valving for the exclusive purpose of attaching a test gauge so that the accuracy of the boiler steam gauge may be ascertained while the boiler is in operation.

J. Stop valves.

1. Except for a single-boiler, prime-mover installation, each steam outlet from a boiler (except safety valve and water column connections) shall be fitted with a stop valve located as close as practicable to the boiler.
2. In a single-boiler, prime-mover installation the steam stop valve may be omitted provided the prime-mover throttle valve is equipped with an indicator to show whether the valve is open or closed and is designed to withstand the required hydrostatic pressure test of the boiler.
3. When a stop valve is so located that water can accumulate, ample drains shall be provided. The drainage shall be piped to a safe location and shall not be discharged on the top of the boiler or its setting.
4. When boilers provided with manholes are connected to a common steam main, the steam connection from each boiler shall be fitted with two stop valves having an ample free-blow drain between them. The discharge of the drain shall be visible to the operator and shall be piped clear of the boiler setting. The stop valves shall consist preferably of one automatic nonreturn valve (set next to the boiler) and a second valve of the outside-screw-and-yoke type.

K. Blowoff connection.

1. The construction of the setting around each blowoff pipe shall permit free expansion and contraction. Careful attention shall be given to the problem of sealing these setting openings without restricting the movement of the blowoff piping.
2. All blowoff piping, when exposed to furnace heat, shall be protected by firebrick or other heat-resisting material constructed so that the piping may be inspected.
3. Each boiler shall have a blowoff pipe, fitted with a valve or cock, in direct connection with the lowest water space. Cocks shall be of the gland or guard type

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and suitable for the pressure allowed. The use of globe valves shall not be permitted. Where the maximum allowable working pressure exceeds 100 psig, each blowoff pipe shall be provided with two valves or a valve and cock; however only one valve need be provided for forced-flow steam generators with no fixed steam and waterline; high-temperature water boilers and those used for traction or portable purposes with less than 100 gallons normal water content.

4. Blowoff piping shall comply with the requirements of the ASME code, Section I, and ANSI B31.1, from the boiler to the valve or valves, and shall be run full size without use of reducers or bushings. All piping shall be steel. Galvanized steel pipe and fittings shall not be used for blowoff piping.
5. All fittings between the boiler and blowoff valve shall be of steel. In case of renewal of blowoff pipe or fittings, they shall be installed in accordance with this chapter for new installations.

L. Repairs and renewals of boiler fittings and appliances. Whenever repairs are made to fittings or appliances or it becomes necessary to replace them, such repairs or replacements shall comply with the requirements for new installations.

M. Each automatically fired steam boiler or system of commonly connected steam boilers shall have at least one steam pressure control device that will shut off the fuel supply to each boiler or system of commonly connected boilers when the steam pressure reaches a preset maximum operating pressure. In addition, each individual automatically fired steam boiler shall have a high steam pressure limit control that will prevent generation of steam pressure in excess of the maximum allowable working pressure.

N. Conditions not covered by this chapter. All cases not specifically covered by this chapter shall be treated as new installations pursuant to 16 VAC 25-50-280 or may be referred to the chief inspector for instructions concerning the requirements.

16 VAC 25-50-370 Heating boilers.

A. Standard boilers. The maximum allowable working pressure of standard boilers shall in no case exceed the pressure indicated by the manufacturer's identification stamped or cast on the boiler or on a plate secured to it.

B. Nonstandard riveted boilers. The maximum allowable working pressure on the shell of a nonstandard riveted heating boiler shall be determined in accordance with 16 VAC 25-50-360 C covering existing installations, power boilers, except that in no case shall the maximum allowable working pressure of a steam heating boiler exceed 15 psig, or a hot water boiler exceed 160 psig

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or 250° F temperature.

C. Nonstandard welded boilers. The maximum allowable working pressure of a nonstandard steel or wrought iron heating boiler of welded construction shall not exceed 15 psig for steam. For other than steam service, the maximum allowable working pressure shall be calculated in accordance with Section IV of the ASME Code.

D. Nonstandard cast iron boilers.

1. The maximum allowable working pressure of a nonstandard boiler composed principally of cast iron shall not exceed 15 psig for steam service or 30 psig for hot-water service.
2. The maximum allowable working pressure of a nonstandard boiler having cast iron shell or heads and steel or wrought iron tubes shall not exceed 15 psig for steam service or 30 psig for hot water service.

E. Safety valves.

1. Each steam boiler must have one or more officially rated (ASME stamped and National Board rated) safety valves of the spring pop type adjusted to discharge at a pressure not to exceed 15 psig. Seals shall be attached in a manner to prevent the valve from being taken apart without breaking the seal. The safety valves shall be arranged so that they cannot be reset to relieve at a higher pressure than the maximum allowable working pressure of the boiler. A body drain connection below seat level shall be provided by the manufacturer and this drain shall not be plugged during or after field installation. For valves exceeding two inch pipe size, the drain hole or holes shall be tapped not less than 3/8 inch pipe size. For valves less than two inches, the drain hole shall not be less than 1/4 inch in diameter.
2. No safety valve for a steam boiler shall be smaller than 3/4 inch unless the boiler and radiating surfaces consist of a self-contained unit. No safety valve shall be larger than 4-1/2 inches. The inlet opening shall have an inside diameter equal to, or greater than, the seat diameter.
3. The minimum relieving capacity of the valve or valves shall be governed by the capacity marking on the boiler.
4. The minimum valve capacity in pounds per hour shall be the greater of that determined by dividing the maximum BTU output at the boiler nozzle obtained by the firing of any fuel for which the unit is installed by 1,000; or shall be determined on the basis of the pounds of steam generated per hour per square foot of boiler

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heating surface as given in Table 2. When operating conditions require it a greater relieving capacity shall be provided. In every case, the requirements of subdivision 5 of this subsection shall be met.

TABLE 2

Minimum Pounds of Steam Per Hour
Per Square Foot of Heating Surface

	Fire Tube Boilers	Water Tube Boilers
Boiler Heating Surface:		
Hand fired	5	6
Stoker fired	7	8
Oil, gas, or pulverized fuel fired	8	10
Waterwall heating surface:		
Hand fired	8	8
Stoker fired	10	12
Oil, gas, or pulverized fuel fired	14	16

NOTES:

When a boiler is fired only by a gas giving a heat value of not in excess of 200 BTU per cubic foot, the minimum safety valve or safety relief valve relieving capacity may be based on the value given for handfired boilers above.

The minimum safety valve or safety relief valve relieving capacity for electric boilers shall be 3-1/2 pounds per hour per kilowatt input.

For heating surface determination see ASME code, Section IV.

5. The safety valve capacity for each steam boiler shall be such that with the fuel burning equipment operating at maximum capacity, the pressure cannot rise more than five psig above the maximum allowable working pressure.
6. When operating conditions are changed, or additional boiler surface is installed,

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the valve capacity shall be increased, if necessary, to meet the new conditions and be in accordance with subdivisions 4 and 5 of this subsection. When additional valves are required, they may be installed on the outlet piping provided there is no intervening valve.

7. If there is any doubt as to the capacity of the safety valve, an accumulation test shall be run (see ASME code, Section VI, Care of Heating Boilers).
 8. No valve of any description shall be placed between the safety valve and the boiler, nor on the discharge pipe between the safety valve and the atmosphere. The discharge pipe shall be at least full size and be fitted with an open drain to prevent water lodging in the upper part of the safety valve or in the discharge pipe. When an elbow is placed on the safety valve discharge pipe, it shall be located close to the safety valve outlet or the discharge pipe shall be securely anchored and supported. All safety valve discharges shall be so located or piped as not to endanger persons working in the area.
- F. Safety relief valve requirements for hot water boilers.
1. Each hot water boiler shall have one or more officially rated (ASME stamped and National Board rated) safety relief valves set to relieve at or below the maximum allowable working pressure of the boiler. Safety relief valves officially rated as to capacity shall have pop action when tested by steam. When more than one safety relief valve is used on hot water boilers, the additional valve or valves shall be officially rated and shall be set within a range not to exceed six psig above the maximum allowable working pressure of the boiler up to and including 60 psig and 5.0% for those having a maximum allowable working pressure exceeding 60 psig. Safety relief valves shall be spring loaded. Safety relief valves shall be so arranged that they cannot be reset at a higher pressure than the maximum permitted by this paragraph.
 2. No materials liable to fail due to deterioration or vulcanization when subject to saturated steam temperature corresponding to capacity test pressure shall be used for any part.
 3. No safety relief valve shall be smaller than 3/4 inch nor larger than 4-1/2 inches standard pipe size, except that boilers having a heat input not greater than 15,000 BTU per hour may be equipped with a safety relief valve of 1/2 inch standard pipe size. The inlet opening shall have an inside diameter approximately equal to, or greater than, the seat diameter. In no case shall the minimum opening through any part of the valve be less than 1/2 inch diameter or its equivalent area.

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4. The required steam relieving capacity, in pounds per hour, of the pressure relieving device or devices on a boiler shall be the greater of that determined by dividing the maximum output in BTU at the boiler outlet obtained by the firing of any fuel for which the unit is installed by 1,000, or on the basis of pounds of steam generated per hour per square foot of boiler heating surface as given in Table 2. When necessary a greater relieving capacity of valves shall be provided. In every case, the requirements of subsection F 6 of this section shall be met.
 5. When operating conditions are changed, or additional boiler heating surface is installed, the valve capacity shall be increased, if necessary, to meet the new conditions and shall be in accordance with subsection F 6 of this section. The additional valves required, on account of changed conditions, may be installed on the outlet piping provided there is no intervening valve.
 6. Safety relief valve capacity for each boiler shall be so that, with the fuel burning equipment installed and operated at maximum capacity the pressure cannot rise more than 6 psig above the maximum allowable working pressure for pressure up to and including 60 psig and 5.0% of maximum allowable working pressures over 60 psig.
 7. If there is any doubt as to the capacity of the safety relief valve, an accumulation test shall be run (see ASME code, Section VI, Care of Heating Boilers).
 8. No valve of any description shall be placed between the safety relief valve and the boiler, nor on the discharge pipe between the safety relief valve and the atmosphere. The discharge pipe shall be at least full size and fitted with an open drain to prevent water lodging in the upper part of the safety relief valve or in the discharge pipe. When an elbow is placed on the safety relief valve discharge pipe, it shall be located close to the safety relief valve outlet or the discharge pipe shall be securely anchored and supported. All safety relief valve discharges shall be so located or piped as not to endanger persons working in the area.
- G. Valve replacement and repair. Safety valves and safety relief valves requiring repair shall be replaced with a new valve or repaired by the original manufacturer, its authorized representative, or the holder of a "VR" Stamp.
- H. Pressure relieving devices. Boilers and fired storage water heaters except those exempted by the Act shall be equipped with pressure relieving devices in accordance with the requirements of Section IV of the ASME Boiler and Pressure Vessel Code.
- I. Instruments, fittings and control requirements. Instruments, fittings and controls for each boiler installation shall comply with the requirements of the ASME Heating Boiler Code, Section

16 VAC 25-50-10 et seq. BOILER AND PRESSURE VESSEL RULES AND REGULATIONS**IV.****J. Low water fuel cutoff.**

1. Each automatically fired hot water heating boiler with heat input greater than 400,000 BTU's per hour shall have an automatic low water fuel cutoff which has been designed for hot water service, located so as to stop the fuel supply automatically when the surface of the water falls to the level established in subdivision 2 of this subsection (also see ASME Heating Boiler Code, Section IV).
2. As there is no normal waterline to be maintained in a hot water heating boiler, any location of the low water fuel cutoff above the lowest safe permissible water level established by the boiler manufacturer is satisfactory.
3. A coil type boiler or a water tube boiler with heat input greater than 400,000 BTU's per hour requiring forced circulation to prevent overheating of the coils or tubes, shall have a flow sensing device installed in the outlet piping, instead of the low water fuel cutoff required in subdivision 1 of this subsection to stop the fuel supply automatically when the circulating flow is interrupted.

K. Steam gauges.

1. Each steam boiler shall have a steam gauge connected to its steam space, its water column, or its steam connection, by means of a siphon or equivalent device exterior to the boiler. The siphon shall be of sufficient capacity to keep the gauge tube filled with water and arranged so that the gauge cannot be shut off from the boiler except by a cock.
2. The range of the scale on the dial of a steam boiler pressure gauge shall be not less than 30 psig nor more than 60 psig. The gauge shall be provided with effective stops for the indicating pointer at the zero point and at the maximum pressure point. The travel of the pointer from 0 to full scale 30 psig shall be at least three inches.

L. Pressure or altitude gauges.

1. Each hot water boiler shall have a pressure or altitude gauge connected to it or to its flow connection in a manner so that it cannot be shut off from the boiler except by a cock with tee or lever handle placed on the pipe near the gauge. The handle of the cock shall be parallel to the pipe in which it is located when the cock is open.

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2. The range of the scale on the dial of the pressure or altitude gauge shall be not less than 1-1/2 times nor more than three times the maximum allowable working pressure. The gauge shall be provided with effective stops for the indicating pointer at the 0 point and at the maximum pressure point.
3. Piping or tubing for pressure or altitude gauge connections shall be of nonferrous metal when smaller than one inch pipe size.

M. Thermometers. Each hot water boiler shall have a thermometer located and connected so that it shall be easily readable when observing the water pressure or altitude gauge. The thermometer shall be located so that it will at all times indicate the temperature in degrees Fahrenheit of the water in the boiler at or near the outlet.

N. Water gauge glasses.

1. Each steam boiler shall have one or more water gauge glasses attached to the water column or boiler by means of valved fittings. The lower fitting shall be provided with a drain valve of the straightaway type with opening not less than 1/4 inch diameter to facilitate cleaning. Gauge glass replacement shall be possible while the boiler is under pressure.
2. Transparent material, other than glass, may be used for the water gauge provided that the material has proved suitable for the pressure, temperature and corrosive conditions encountered in service.

O. Stop valves and check valves.

1. If a boiler can be closed off from the heating system by closing a steam stop valve, there shall be a check valve in the condensate return line between the boiler and the system.
2. If any part of a heating system can be closed off from the remainder of the system by closing a steam stop valve, there shall be a check valve in the condensate return pipe from that part of the system.

P. Feedwater connections.

1. Feedwater, make-up water, or water treatment shall be introduced into a boiler through the return piping system or through an independent feedwater connection which does not discharge against parts of the boiler exposed to direct radiant heat from the fire. Feedwater, make-up, or water treatment shall not be introduced through openings or connections provided for inspection or cleaning, safety valve,

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safety relief valve, surface blowoff, water column, water gauge glass, pressure gauge or temperature gauge.

2. Feedwater piping shall be provided with a check valve near the boiler and a stop valve or cock between the check valve and the boiler or return pipe system.

Q. Return pump. Each boiler equipped with a condensate return pump, where practicable, shall be provided with a water level control arranged to maintain the water level in the boiler automatically within the range of the gauge glass.

R. Repairs and renewals of boiler fittings and appliances. Whenever repairs are made to fittings or appliances, or it becomes necessary to replace them, the repairs or replacements shall comply with the requirements for new installations.

S. Conditions not covered by this chapter. Any case not specifically covered by this chapter shall be treated as a new boiler or pressure vessel installation pursuant to 16 VAC 25-50-280 or may be referred to the chief inspector for instructions concerning the requirements.

16 VAC 25-50-380 Pressure vessels.

- A. Maximum allowable working pressure for standard pressure vessels.

The maximum allowable working pressure for standard pressure vessels shall be determined in accordance with the applicable provisions of the edition of the ASME or API-ASME code under which they were constructed and stamped. The maximum allowable working pressure shall not be increased to a greater pressure than shown on the manufacturers nameplate stamping and data report.

- B. Maximum allowable working pressure for nonstandard pressure vessels.

1. For internal pressure. The maximum allowable working pressure on the shell of a nonstandard pressure vessel shall be determined by the strength of the weakest course computed from the thickness of the plate, the tensile strength of the plate, the efficiency of the longitudinal joint, the inside diameter of the weakest course and the factor set by this chapter.

$$\frac{TStE}{RFS} = \text{maximum allowable working pressure, psi}$$

where:

TS = ultimate tensile strength of shell plate, psi. When the tensile strength of the steel plate is not known, it shall be taken as 55,000 psi for temperatures not

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exceeding 700°F.

t = minimum thickness of shell plate of weakest course, inches,

E = efficiency of longitudinal joint depending upon construction. Use the following values: For riveted joints- calculated riveted efficiency;

For fusion-welded joints:

Single lap weld	40 %
Double lap weld	50 %
Single butt weld	60 %
Double Butt weld	70 %
Forge weld	70 %
Brazed steel	80 %

R = inside radius of weakest course of shell, inches, provided the thickness does not exceed 10% of the radius. If the thickness is over 10% of the radius, the outer radius shall be used.

FS = factor of safety allowed by this chapter.

2. For external pressure. The maximum allowable working pressure for cylindrical nonstandard pressure vessels subjected to external or collapsing pressure shall be determined by the rules in Section VIII, Division 1, of the ASME code.
3. Factors of safety. The minimum factor of safety shall in no case be less than four for existing installations. The factor of safety may be increased when deemed necessary by the inspector to insure the operation of the vessel within safe limits. The condition of the vessel and the particular service of which it is subject will be the determining factors.
4. The maximum allowable working pressure permitted for formed heads under pressure shall be determined by using the appropriate formulas from Section VIII, Division 1, ASME code and the tensile strength and factors of safety given in subdivisions 1 and 3 of this subsection.

C. Inspection of inaccessible parts. Where in the opinion of the inspector, as the result of conditions disclosed at the time of inspection, it is advisable to remove the interior or exterior lining, covering, or brickwork to expose certain parts of the vessel not normally visible, the owner or user shall remove the materials to permit proper inspection and to establish construction details. Metal thickness shall be determined utilizing appropriate equipment including drilling if necessary.

D. Pressure relief devices. Pressure relief devices for each pressure vessel installation, not exempt by the Act, shall comply with the requirements of ASME Pressure Vessel Code, Section VIII.

16 VAC 25-50-10 et seq. BOILER AND PRESSURE VESSEL RULES AND REGULATIONS**E. Safety appliances.**

1. Each pressure vessel shall be protected by safety and relief valves and indicating and controlling devices which will insure its safe operation. These valves and devices shall be constructed, located and installed so that they cannot readily be rendered inoperative. The relieving capacity of the safety valves shall prevent a rise of pressure in the vessel of more than 10% above the maximum allowable working pressure, taking into account the effect of static head. Safety valve discharges shall be located or piped so as not to endanger persons working in the area.
2. Safety valves and safety relief valves requiring repair shall be replaced with a new valve or repairs shall be performed by the original manufacturer, its authorized representative, or the holder of a "VR" Stamp.

F. Repairs and renewals of fittings and appliances. Whenever repairs are made to fittings or appliances, or it becomes necessary to replace them, the repairs or replacements shall comply with the requirements for new installations.

G. Conditions not covered by this chapter. All cases not specifically covered by this chapter shall be treated as new installations or may be referred to the chief inspector for instructions concerning the requirements.

PART IV General Requirements.

16 VAC 25-50-390 Inspection of boilers and pressure vessels.

All boilers and pressure vessels, not exempt by the Act, shall be inspected internally and externally, as provided by this chapter, by a special inspector. The owner or user shall prepare each boiler or pressure vessel for the inspection and for appropriate pressure tests, whenever necessary. To prepare equipment for an internal inspection the following actions shall be taken as applicable:

1. Boilers
 - a. Cool the boiler, furnace and setting sufficiently to prevent damage to any part;
 - b. Drain and wash thoroughly internal parts to be inspected and adequately ventilate all interior surfaces;
 - c. Remove manhole and handhole plates, wash out openings, drains and inspection plugs;
 - d. Remove a sufficient number of grates of internally fired boilers as required

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- by the inspector;
 - e. Remove brickwork, refractory and insulation, as required by the inspector, to determine condition of boiler, headers, tubes, furnace, structural supports, and other parts;
 - f. Prevent leakage of water, steam or vapors into boiler interiors that would endanger personnel;
 - g. Before opening the manhole or handhole covers and entering any parts of the steam-generating unit connected to a common header with other boilers, the nonreturn and steam stop valves must be closed, locked out and drain valves or cocks between the two valves opened. The feed and check valves must be closed, locked out and drain valves or cocks located between the two valves opened. After draining the boiler, the blowoff valves shall be closed and locked out. Blowoff lines, where practicable, shall be disconnected between pressure parts and valves. All drains and vent lines shall be opened;
 - h. Prepare the pressure gauge for testing; and
 - i. Comply, where applicable, with Virginia law regarding work conducted within confined spaces, pursuant to Virginia Occupational Safety and Health (VOSH) regulation 16 VAC 25-90-1910.146, Permit Required Confined Space for General Industry.
2. Pressure vessels
- a. Remove manhole and handhole plates, cleaning and inspection plugs;
 - b. Clean internal surfaces and adequately ventilate all interior spaces;
 - c. Isolate the unit to the extent that internal temperature, pressure and environment are not injurious to personnel and are under strict control during complete inspection;
 - d. Remove linings or coverings, as required by the inspector, to determine true physical condition of the vessel and its components;
 - e. Make protective and regulating controls readily accessible for inspection;
 - f. Prepare the pressure gauges for testing , and;
 - g. Comply, where applicable, with Virginia law regarding work conducted within confined spaces, pursuant to Virginia Occupational Safety and Health (VOSH) regulation 16 VAC 25-90-1910.146, Permit Required Confined Space for General Industry.

16 VAC 25-50-400 Boilers and pressure vessels improperly prepared for inspection.

If a boiler or pressure vessel has not been properly prepared for an internal inspection, or if the owner or user fails to comply with the requirements for a hydrostatic test as set forth in this chapter, the inspector may decline to make the inspection or test and the inspection certificate

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shall be withheld until the owner or user complies with the requirements.

16 VAC 25-50-410 Removal of covering to permit inspection.

If the boiler or pressure vessel is jacketed so that the seams of shells, drums, or domes cannot be seen, sufficient jacketing, setting wall, or other form of casing or housing shall be removed to permit reasonable inspection of the seams and so that the size of the rivets, pitch of the rivets, and other data necessary to determine the safety of the boiler or pressure vessel may be obtained, provided such information cannot be determined by other means.

The inspector shall not remove any insulation or covering and may refuse to enter boiler or equipment rooms where the inspector believes an asbestos exposure exists. To determine if an asbestos exposure may exist, the inspector may request to review the owner or user's asbestos maintenance program, where applicable, under the Virginia Occupational Safety and Health (VOSH) Program, Occupational Exposure to Asbestos, Construction Industry, Appendix G, 16 VAC 25-175-1926.1101.

16 VAC 25-50-420 Lap-seam crack.

The shell of a pressure vessel, in which a lapseam crack is discovered along a longitudinal riveted joint, shall be shut down immediately. If the equipment is not more than 15 years of age, a complete new course of the original thickness may be installed at the discretion of the inspector and after approval by the chief inspector. Patching is prohibited.

16 VAC 25-50-430 Hydrostatic pressure tests.

A. A hydrostatic pressure test, when applied to boilers or pressure vessels, shall not exceed 1-1/2 times the maximum allowable working pressure, except as provided by the ASME code. The pressure shall be under proper control so that in no case shall the required test pressure be exceeded by more than 2.0%.

B. See 16 VAC 25-50-360 A 4 for temperature limitations on particular power boiler installations.

C. When a hydrostatic test is to be applied to existing installations, the pressure shall be as follows:

1. For all cases involving the question of tightness, the pressure shall be equal to the working pressure.

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2. For all cases involving the question of safety, the pressure shall be equal to 1-1/2 times the maximum allowable working pressure for temperature. During such test the safety valve or valves shall be removed or each valve disk shall be held to its seat by means of a testing clamp and not by screwing down the compression screw upon the spring.

16 VAC 25-50-440 Automatic low-water fuel cutoff and/or water-feeding device.

- A. Each automatically fired and unattended steam or vapor system boiler, except miniature boilers, shall be equipped with at least two automatic low-water fuel cutoffs located so as to cut off the fuel or energy supply automatically when the surface of the water falls to the lowest safe water line. Functioning of the lower of the two controls shall cause safety shutdown and lockout. The manual reset may be incorporated in the lower cutoff control. If a water-feeding device is installed, it shall be constructed so that the water inlet valves cannot feed water into the boiler through the float chamber and located so as to supply requisite feedwater. The lowest safe water line should be not lower than the lowest visible part of the water glass.
- B. The fuel cutoff or water feeding device shall be attached directly to a boiler or in the tapped openings available for attaching a water glass directly to a boiler, provided the connections are made to the boiler with nonferrous tees or Y's not less than 1/2 inch pipe size between the boiler and the water glass so that the water glass is attached directly and as close as possible to the boiler; the run of the tee or Y shall take the water glass fittings, and the side outlet or branch of the tee or Y shall take the fuel cutoff or water feeding device. The ends of all nipples shall be reamed to full-size diameter.
- C. Fuel cutoffs and water feeding devices embodying a separate chamber shall have a vertical drain pipe and a blowoff valve not less than 3/4 inch pipe size, located at the lowest point in the water equalizing pipe connections so that the chamber and the equalizing pipe can be flushed and the device tested.
- D. A forced circulation coil or water tube type boiler, with a heat input greater than 400,000 BTU's per hour shall have a flow sensing device installed to cut off the fuel supply at a minimum water circulation flow rate in the boiler. The boiler manufacturer's specifications for the safe minimum flow rate, setting, and location of the flow sensing device shall be utilized.

16 VAC 25-50-445 Pressure control devices.

Each automatically fired steam boiler or system of commonly connected steam boilers shall have at least one steam pressure control device that will shut off the fuel supply to each

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boiler or system of commonly connected boilers when the steam pressure reaches a preset maximum operating pressure. In addition, each individual automatically fired steam boiler shall have a high steam pressure limit control with a manual reset that will prevent generation of steam pressure in excess of the maximum allowable working pressure and can cause safety shutdown and lockout.

16 VAC 25-50-450 Pressure-reducing valves.

- A. Where pressure-reducing valves are used, one or more relief or safety valves shall be provided on the low-pressure side of the reducing valve when the piping or equipment on the low-pressure side does not meet the requirements for the full initial pressure. Proper protection shall be provided to prevent injury or damage caused by the escaping fluid from the discharge of relief or safety valves if vented to the atmosphere. The combined discharge capacity of the relief or safety valves shall be such that the pressure rating of the lower pressure piping or equipment shall not be exceeded in case the reducing valve sticks open.
- B. The use of hand-controlled bypasses around reducing valves is permissible. If a bypass is used around the reducing valve, the safety valve required on the low pressure side shall be sufficient capacity to relieve all the fluid that can pass through the bypass without overpressuring the low pressure side.
- C. A pressure gauge shall be installed on the low-pressure side of a reducing valve.

16 VAC 25-50-460 Blowoff equipment.

- A. The blowdown from a boiler or boilers that enters a sewer system or blowdown which is considered a hazard to life or property shall pass through blowoff equipment that will reduce pressure and temperature as required below.
- B. The temperature of the water leaving the blowoff equipment shall not exceed 140°F.
- C. The pressure of the blowdown leaving any type of blowoff equipment shall not exceed 5.0 psig.
- D. The blowoff piping and fittings between the boiler and the blowoff tank shall comply with Section I of the ASME code and ANSI B31.1.
- E. All materials used in the fabrication of boiler blowoff equipment shall comply with Section II of the ASME code.

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- F. All blowoff equipment shall be fitted with openings to facilitate cleaning and inspection.
- G. Blowoff equipment which conforms to the provisions set forth in the National Board publication, "Boiler Blowoff Equipment", shall meet the requirements of this section.

16 VAC 25-50-470 Location of discharge piping outlets.

The discharge of safety valves, blowoff pipes and other outlets shall be located so as to prevent injury to personnel.

16 VAC 25-50-480 Repairs and alterations.

- A. Prior to any repair, the owner or user shall notify a special inspector with the appropriate endorsement for direction or advice, or both, regarding the method and extent of repair.
- B. Repairs to boilers and pressure vessels shall be done in accordance with the National Board Inspection Code by holders of an "R" Certificate of Authorization. The completed repairs shall be reviewed by and found acceptable to the inspector or the same inspection agency who authorized the repair.
- C. Alterations to boilers and pressure vessels shall be performed by an organization holding an appropriate ASME or "R" Certificate of Authorization and shall be in accordance with the National Board Inspection Code.
- D. All repairs and alterations, except seal welds as defined in this subsection shall be reported on the applicable Report of Welded Repair or Alteration form. The completed form including proper certification shall be forwarded to the chief inspector by the organization performing the repair or alteration. A seal weld is a tube-to-tube sheet weld used to supplement an expanded tube joint to ensure leak tightness. Seal welds on carbon steel (P-1) tube joints made by qualified welders will not require an inspection nor a Form R-1.
- E. The completed forms for routine repairs, as the term is defined in the National Board Inspection Code, need not be forwarded to the chief inspector.

16 VAC 25-50-490 Supports.

Each boiler and pressure vessel shall be supported by masonry or structural supports of sufficient strength and rigidity to safely support the boiler or pressure vessel and its contents. There shall be no excessive vibration in the boiler, pressure vessel, or their connected piping or

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fittings.

16 VAC 25-50-500 Boiler door latches.

- A. A water tube boiler shall have the firing doors of the inward-opening type, unless such doors are provided with substantial and effective latching or fastening devices or otherwise so constructed as to prevent them, when closed, from being blown open by pressure on the furnace side.
- B. These latches or fastenings shall be of the positive self-locking type. Friction contacts, latches, or bolts actuated by springs shall not be used. The foregoing requirements for latches or fastenings shall not apply to coal openings of downdraft or similar furnaces.
- C. All other doors, except explosion doors, not used in the firing of the boiler, may be provided with bolts or fastenings instead of self-locking latching devices.
- D. Explosion doors, if used and if located in the setting walls within seven feet of the firing floor or operating platform, shall be provided with substantial deflectors to divert the blast.

16 VAC 25-50-510 Clearance.

When boilers are replaced or new boilers are installed in either existing or new buildings, a minimum clearance of two feet on all service sides shall be provided. Boilers and pressure vessels having manholes shall have five feet clearance from the manhole opening and any wall, ceiling or piping that will prevent a person from entering the boiler or vessel. All boilers and pressure vessels shall be located so that adequate space will be provided for the proper operation of the boilers and pressure vessels and their appurtenances, for the inspection of all surfaces, tubes, waterwalls, economizers, piping, valves and other equipment, and for their necessary maintenance and repair and replacement of tubes.

16 VAC 25-50-520 Ladders and runways.

When necessary for safety, there shall be a steel runway or platform of standard construction installed across the tops of adjacent boilers or pressure vessels or at some other convenient level for the purpose of affording safe access. All runways shall have at least two means of exit each to be remotely located from the other.

16 VAC 25-50-530 Air and ventilation requirements.

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A permanent source of outside air shall be provided for each boiler room to permit satisfactory combustion of the fuel as well as proper ventilation of the boiler room under normal operating conditions.

A. The total requirements of the burners for all fired pressure vessels in the boiler room must be used to determine the louver sizes whether fired by coal, oil or gas; however, the minimum net free louvered area must not be less than one square foot. The following table or formula shall be used to determine the net louvered area in square feet:

Input BTU Per Hour	Required Air Cu. Ft./Min.	Min. Net Louvered Area Sq. Ft.
500,000	125	1.0
1,000,000	250	1.0
2,000,000	500	1.6
3,000,000	750	2.5
4,000,000	1,000	3.3
5,000,000	1,250	4.1
6,000,000	1,500	5.0
7,000,000	1,750	5.8
8,000,000	2,000	6.6
9,000,000	2,250	7.5
10,000,000	2,500	8.3

$$\frac{(\text{BTU per hour} \div 100) \times 1.5}{60} \div 300 = \text{Min Net Area Req. Sq. Ft.}$$

B. When mechanical ventilation is used instead of subsection A of this section, the supply of combustion and ventilation air to the boiler room and the firing device shall be interlocked with the fan so the firing device will not operate with the fan off. The velocity of the air through the ventilating fan shall not exceed 500 feet per minute and the total air delivered shall be equal to or greater than shown in this section.

16 VAC 25-50-540 Jacketed kettles and miniatures boilers.

Jacketed kettles and miniature boilers are acceptable for installation if constructed and stamped in accordance with Section I, IV, or VIII, Division 1, of the ASME code and registered with the National Board.

16 VAC 25-50-550 Fuel burning apparatus and systems (flame safeguard).

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Fuel burning apparatus and systems shall be equipped with regulating and protective controls in accordance with applicable standards of the American Gas Association, Underwriters Laboratories, ANSI/ASME-CSD-1, or National Fire Protection Association (NFPA) No. 85 Series, or equivalent recognized standards.

16 VAC 25-50-560 Inspection of secondhand or used boilers or pressure vessels.

Inspections of secondhand or used boilers or pressure vessels made by the Chief Inspector or a Commonwealth Inspector shall be charged for in accordance with § 40.1-51.15 of the Act.

16 VAC 25-50-570 Conditions not covered by this chapter.

For any condition not covered by this chapter, the applicable provisions of the National Board Inspection Code or the ASME code shall apply.

FORMS

R 1 Form, Report of Welded _____ Repair or _____ Alteration, CVR1 Rev 1.0.
Form R-1 Report of Welded Repair, National Board Inspection Code, (eff. 1/1/99)
Form R-2 Report of Alteration, National Board Inspection Code (eff. 1/1/99)
Form R-3 Report of Parts Fabricated By Welding, National Board Forms (eff. 1/1/99)
Form R-4 Report Supplementary Sheet, National Board Forms (eff 1/1/99)
BPV-5 Boiler or Pressure Vessel Data Report- First Internal Inspection, (1/1/99)
BPV-6 Boiler - Fired Pressure Vessel - Report of Inspection, (eff. 1/1/99)

Documents Incorporated by Reference

2001 Boiler and Pressure Vessel Code, ASME Code, American Society of Mechanical Engineers.

National Board Bylaws, National Board of Boiler and Pressure Vessel Inspectors, August 8, 1996.

ANSI/NB 23, 2001 National Board Inspection Code, National Board of Boiler and Pressure Vessel Inspectors.

ASME B 31.1, ASME Code for Pressure Piping, American National Standards Institute, 1998.

16 VAC 25-50-10 et seq. BOILER AND PRESSURE VESSEL RULES AND REGULATIONS

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